

**Amendments to the Claims:**

This listing of claims will replace all prior versions and listings of claims in the application:

**Listing of Claims:**

1. (Currently Amended) A method for separating an isotope of thallium in an atomic vapor containing a plurality of isotopes of thallium ~~including said isotope~~, said method comprising the steps of:

(a) producing photons of a first frequency by a laser system, wherein a wave length of said first frequency is about 378 nm;

(b) producing photons of a second frequency by said laser system, wherein a wave length of said second frequency is about 292 nm;

(c) producing photons of a third frequency by said laser system, wherein a wave length of said third frequency is in the range of 700 nm to 1400 nm;

(d) applying said photons of said first, second and third frequencies to said vapor ~~of said thallium~~, wherein said photons of said first frequency pump isotope-selectively a plurality of ground state thallium atoms through an excited state into a metastable state, and wherein said photons of said second frequency excite a plurality of metastable state thallium atoms to an intermediate, resonant state, and wherein said photons of said third frequency ionize a plurality of atoms in said intermediate, resonant state through continuum states; and

(e) collecting said isotope ions.

2. (Original) The method of claim 1 wherein said photon of said first frequency is produced by one or more continuous wave lasers.

3. (Currently Amended) The method of claim 1 wherein ~~said pumping is performed by applying said~~ the photons of said first frequency ~~to pump pump said optically and isotope selectively said isotope atoms~~ of thallium from the ground state through ~~a first excite~~ the excited state at an energy of 26477.6 cm<sup>-1</sup> relative ~~to the zero to zero~~ energy ~~of said of the~~ ground state ~~into a and into the~~ metastable state at an energy of 7793 cm<sup>-1</sup> relative to the zero energy ~~of said of the~~ ground state.

4. (Currently Amended) The method of claim 1 wherein ~~said photon~~ the photons of said second frequency ~~is-produced~~ are produced by one or more pulsed lasers.

5. (Currently Amended) The method of claim 1 wherein ~~said exciting step by the photons of the second frequency to an intermediate, resonant state is performed by exciting~~ excite the thallium atoms in the metastable state to a ~~second excited~~ the intermediate resonant state at an energy of  $42049.0 \text{ cm}^{-1}$  relative to the zero to zero energy of said ground state.

6. (Currently Amended) The method of claim 1 wherein ~~said exciting step by the photons of the second frequency to an intermediate, resonant state is performed by exciting~~ excite the thallium atoms in the metastable state to a ~~second excited~~ the intermediate, resonant state at an energy of  $42011.4 \text{ cm}^{-1}$  relative to the zero to zero energy of said ground state.

7. (Currently Amended) The method of claim 1 wherein ~~said photon~~ the photons of said third frequency ~~is-produced~~ are produced by one or more pulsed lasers.

8. (Currently Amended) The method of claim 1 wherein ~~said ionizing step by the photons of the third frequency is performed by applying said photons of said third frequency to~~ ionize atoms in said ~~second excited~~ the intermediate, resonant state at an energy of  $42049.0 \text{ cm}^{-1}$  ~~to continuum~~ to the continuum states at an energy range of  $49266.7 \text{ cm}^{-1} \sim 55000 \text{ cm}^{-1}$  relative to the zero to zero energy of said ground state.

9. (Currently Amended) The method of claim 1 wherein ~~said ionizing step by the photons of the third frequency is performed by applying said photons of said third frequency to~~ ionize atoms in said ~~second excited~~ the intermediate, resonant state at an energy of  $42011.4 \text{ cm}^{-1}$  to continuum states at an energy range of  $49266.7 \text{ cm}^{-1} \sim 55000 \text{ cm}^{-1}$  relative to the zero to zero energy of said ground state.

10. (Original) The method of claim 1 wherein the step of collecting said isotope ions comprises applying an electric field to said vapor.

11. (Currently Amended) The method of claim 4 wherein ~~said exciting step by the photons of the second frequency to an intermediate, resonant state is performed by exciting~~ excite the thallium atoms in the metastable state to a ~~second excited~~ the intermediate, resonant state at an energy of  $42049.0\text{ cm}^{-1}$  relative ~~to the zero~~ to zero energy of said ground state.

12. (Canceled) The method of claim 6 wherein said exciting step by the photons of the second frequency to an intermediate, resonant state is performed by exciting the thallium atoms in the metastable state to a second excited state at an energy of  $42011.4\text{ cm}^{-1}$  relative to the zero energy of said ground state.